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ABSTRACT:

A telescopic support platform has at least two stages 100, 102 lockable 120 to provide a range of heights. Preferably a user can stand inside the tower structure, raise the upper stage(s) 102 as required, and then climb up inside (thus maintaining stability). A platform 164, 166 mounted to the top stage preferably has an openable part 166 which the user can climb through, still keeping his weight inside the base. Preferably there are support legs (130, Fig 9) pivotable outwardly to provide enhanced stability.

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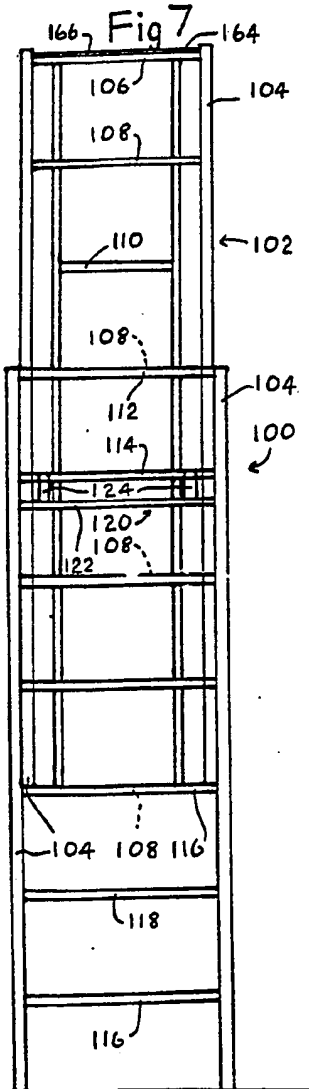
# (54) Support platform

(57) A telescopic support platform has at least two stages 100, 102 lockable 120 to provide a range of heights. Preferably a user can stand inside the tower structure, raise the upper stage(s) 102 as required, and then climb up inside (thus maintaining stability). A platform 164, 166 mounted to the top stage preferably has an openable part 166 which the user can climb through, still keeping his weight inside the base. Preferably there are support legs (130, Fig 9) pivotable outwardly to provide enhanced stability.

Fig 7

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# SUPPORT PLATFORM

The present invention relates to a support platform, e.g. for builders and decorators. It is particularly concerned with a support platform that is easily mobile, and is easily arranged for use, when it can be free-standing.

There is often a requirement for an elevated platform. A simple stepladder may be inadequate, but the available alternatives are either ramshackle, or require to be constructed laboriously from sets of scaffolding or the like.

The present invention provides a support platform assembly comprising a telescopic tower. Preferably it is free-standing. Preferably there are articulated support arms which can be extended in use to increase the effective size of the base, and thus increase the stability of the tower. Preferably the tower can be locked at a plurality of heights. In a preferred embodiment, the support platform, in its retracted state, is small enough to go through a conventional doorway. It may have wheels to facilitate transport, the wheels being removable or disablable when the platform is to be used. Preferably it includes a platform mounted or mountable to an upper stage; the platform having a portion which is movable from a support position to create an opening; the stages and platform being arranged such that a user can ascend the stages generally inside the assembly, climb through said opening, and return the movable portion

of the platform to its support position.

Some embodiments of the invention will now be described in greater detail with reference to the accompanying drawings in which:

Fig. 1 is a perspective view of the telescopic tower of a platform according to a first embodiment of the invention;

Fig. 2 is a schematic view of the tower showing the hoisting arrangement;

Fig. 3 is a side view of the platform showing the support assembly extended;

Fig. 4 is a front view of the bottom stage of the tower and the support assembly, on a smaller scale;

Figs. 5 and 6 are side views of the bottom stage and support assembly, showing different stages in the extension of the support assembly;

Fig. 7 is a side elevation of a second embodiment;

Fig. 8 is a sequence of views showing operation of a detent mechanism;

Fig. 9 is a front view of the bottom stage showing support legs;

Fig. 10 is a detailed plan view of a securing clamp of a support leg;

Fig. 11 is a side elevation showing engagement of a wheel member;

Figs. 12 and 13 show forms of foot member in vertical section; and

Figs. 14 and 15 are plan and front elevational views showing a platform.

All of the views are more or less schematic, many elements being omitted for the sake of clarity.

In this embodiment, the tower 10 has three telescopic stages: a fixed bottom stage 12; a middle stage 14; and an upper stage 16, all stages 12, 14, 16 preferably being of the same height. Each stage is substantially a cuboid, having four vertical edges formed e.g. of L-section girders 18; and a plurality of horizontal struts delimiting or extending across the vertical faces. The upper stage 16 fits slidably within the middle stage 14, which in turn fits slidably inside the bottom stage 12. In the telescoping, the L-section girders 18 of the stage above fit slidably within the girders 18 of the stage below. In order to facilitate sliding, there may be friction reducing means such as nylon guides or rollers. Preferably there are means such as pulleys to assist in the raising and lowering of the tower 10. A suitable arrangement is shown in Figs. 1 and 2. This makes use of a pair of ropes or tapes 22, 24. The first rope 22 has a free end. It passes successively through an aperture 26 in a front transverse strut 28 at the top of the bottom stage 12; and through a pair of apertures 30 in struts 31 at the front and rear of the bottom of the middle stage 14, before being secured to the rear fixed struts 28. The second rope 24 is fixed at either end to the fixed strut 28. Following it from either end, it passes

through an aperture 36 in a front or rear strut 38 at the top of the middle stage 14; through a pair of apertures 40 in struts 42 at the front and rear of the bottom of the upper stage 16; and then through a second aperture 36 in an upper strut 38 of the middle stage 14, before passing to the second fixed end on the other fixed strut 28. It will be seen that if the free end of the rope 22 is pulled out through the aperture 26 to a length 2 $\underline{l}$, then the middle stage 14 is raised by a height $\underline{l}$, and the upper stage 16 is raised by a height $\underline{l}$ relative to the middle stage 14, so that the overall height of the tower 10 increases by 2 $\underline{l}$. Of course, other pulley arrangements can be devised. This one is quite convenient since it gives a useful mechanical advantage for lifting the middle stage 14, without requiring great lengths of rope to be pulled, or rope paths of great complexity. To assist in the operation, the "apertures" through which the ropes pass may have friction reducing means such as rollers or nylon V-blocks.

Once the tower 10 has been extended to the desired height, the stages should be locked in position. A simple way of achieving this is to provide the various L-section girders 18 with apertures, and to pass pins through apertures in register. Of course, there are many ways in which the stages can be locked, and some more will be described later.

As shown in Figs. 3 to 6, the bottom stage 12 has a support assembly 46. At either side, the bottom stage 12

has a pair of cross members 48, 50 of L-section. The upper member 48 is adjacent the top of the stage 12, and its horizontal limb is uppermost, providing a flange extending away from the interior of the tower 10. The lower member 50 is spaced some way above the bottom of the stage 12. It too provides a projecting flange, this time at the bottom of the member 50. A pair of long struts 52, 54 are pivoted to respective ones of the cross members 48, 50 at the rear. The lower strut 54 is slightly longer than the upper one 52. At their free ends, each of the long struts is connected to a respective shorter strut 56, 58, which are mutually connected at their other ends. The short strut 58 connected to the lower long strut 54 is of L-section, such that pivoting of the short struts 56, 58 is limited by abutment of the strut 56 with an arm of the L-strut 58. The pivot of the lower long strut 54 and short strut 58 also bears a short leg piece 60. This is also of L-section material in order to control its range of pivoting. In the configuration shown in Fig. 3, the long struts 52, 54 are substantially horizontal, and are pivoted as far as they can go (upwardly in the case of the upper strut 52; downwardly in the case of the strut 54), so that they abut the flanges of the cross members 48,50. The short struts 56, 58 are slightly too long to form a straight line, and are pushed inwardly so that the contact of the flange of the lower strut 58 on the upper strut 56 provides a stop, and a stable configuration is attained. Likewise, the leg piece 60 is pivoted to its

limit, where it provides a stable ground-engaging leg whose end is in line with the bottom ends of the girders 18 of the bottom stage 12.

Fig. 5 shows how the support assembly 46 can be folded away, so as hardly to project beyond the tower 10. An intermediate stage is shown in Fig. 6. As can be seen from Fig. 4, there is a like support assembly 46 at either side of the tower, and the end of each long strut 52 or 54 is joined by a horizontal tie rod 62 or 64 to the corresponding strut at the other side.

Of course, many alternative arrangements can be devised, and some will be described later. However, the one illustrated is particularly simple and satisfactory, since it allows the effective area of the base of the tower to be extended quite considerably with simple means, which stow away easily into a small volume. When extended, the additional framework is quite stable, being locked by the abutment of the long struts 52, 54 on flanges of the cross members 48, 50, and by engagement of flanges of the L-sectioned lower short strut 58 and leg piece 60 on adjacent components. For greater security, a link may be provided which holds the pair of short struts 56, 58 in the limiting position. This could be a simple tie rod extending from their mutual pivot to the adjacent girder 18 of the bottom stage 12.

Fig. 3 shows in phantom an additional stabilizing strut 66 extending between an upper region of the middle

stage 14 and an intermediate region of the upper long strut 52. This provides an additional or alternative way of stabilizing the middle stage 14 at a desired position. To allow for variation, the stabilizing strut 66 has a plurality of apertures 68, as may the projecting region of the strut 52. Thus the stabilizing strut 66 can secure the middle stage 14 in many positions when a pin is inserted through apertures in register in the struts 52, 66.

The leg piece 60 may be cantilevered, so that as the support assembly 46 is extended, it automatically pivots to its ground-engaging orientation.

At the top of the upper stage 16, there is a platform 70. This is suitably formed of supported aluminium mesh so as to be light and well-drained. For easy access to the platform 70, each stage may have an integral ladder 71, as shown for the bottom stage in Fig. 4. For safety, the platform 70 is preferably provided with side rails. As shown in Fig. 3, a pair of upright arms 74 connected at the top by a cross piece 76 may be pivoted at either side, on top of the girders 18. One pair of arms 74 may be slightly more widely spaced than the other, so that they can be pivoted down almost flat on the surface of the platform 70, the one pair of arms 74 embracing the other. When pivoted to the vertical position, a stop may be provided, e.g. by abutment against flanges of short L-section pieces 78 projecting above the girders 18. Thus the arms 74 are positively located in the erect position. The pair of rear arms 74 are

bridged by a bar 80, as are the front arms 74. Each bar 80 has an elongated aperture adjacent either end through which the arms 74 pass. Thus a bar 80 can be slid down adjacent the platform 70 (passing over the L-pieces 78), and permitting the pivoting of the arms 74. When raised fully it passes over detents adjacent the top of the arms 74, so it is retained at the location shown in Figs. 1 and 3.

The platform 70 may bear a short extending ladder, whose lower end is slidably engaged with the strut 82 at the front of the platform; and which is braced by supporting arms which are slidably engaged with the strut 84 at the rear of the platform. Preferably the ladder could retract, and the supporting arms could slide down it, so that the whole could lie flat across the platform 70. An alternative way of providing additional height would be to have hinged seats or shelves at either lateral side of the platform, pivoted to the arms 74 and braced by struts. A plank could be laid across the two seats.

Some alternatives to the illustrated support assembly 46 will now be described. It may be desired to have a support assembly that extends to the rear as well as to the front. Whereas something similar to that illustrated could be devised, it would be difficult to accommodate the struts. Particularly if there is to be support in two directions, it may not be necessary for the arms to extend so far. Thus, a simpler array of struts may be suitable. For example, a three-strut support assembly could use a lower strut 54

similar to that shown in Fig. 3 (but possibly shorter), connected at its front end to a pair of short struts that extend to the top of the front L-section girder 18. A still smaller support assembly might replace the lower long strut 54 by another short strut, extending horizontally to the front L-section girder 18. In a further type of variation, the upwardly extending pair of short struts could be made still shorter, and pivoted to an intermediate region of the front L-section girder 18 instead of to its top. In all these cases, the pivoting to the storage position may be similar to that illustrated.

A more radical variant employs only a single strut. For example, a single long strut like the lower long strut 54 in Fig. 3 may pivot as shown, and engage a locking means to hold it in the horizontal configuration. For example, it may pass a spring loaded detent on the girder 18. A similar arrangement could employ a strut pivoted at a higher region of the girder 18, and having a correspondingly lengthened leg piece 60. Such a strut and leg piece could straddle an obstruction.

In all embodiments, leg pieces 60 and/or the legs provided by the ground engaging portions of the girders 18 of the bottom stage 12, may be provided with wheels and/or extensions. For example, there may be small, retractable wheels such that the whole platform assembly can be moved when unloaded. Preferably the wheels automatically retract when the platform is loaded, e.g. by a worker climbing onto

it. A pair of large wheels may be detachably attached at one end to facilitate moving the platform over greater distances. Leg extensions may be provided by portions of L-section girder having pairs of prongs engagable in pairs of apertures in the leg pieces 60 and/or girders 18. Such extensions could allow the platform to be stably erected on a sloping surface or adjacent stairs.

In order to control the telescoping action of the stages of the tower 10, there may be a generous clearance allowed between the sliding parts of successive stages, with means being provided to take up the clearances when the stages are locked. For example, there may be cams which are rotatable to urge the girders 18 at one side apart, so that the girders at the other side are urged together. The raising of the stages may be assisted by springs selected to counter-balance much of their weight. As an example of a further way for locking stages at desired heights, mention may be made of the use of pivoting catches comprising J-shaped members pivoted so as to slope rearwardly. Such a catch is arranged so that a bar on a relatively movable stage can hit it from beneath, causing it to pivot anti-clockwise and then drop back, so that the bar is held in the hook of the "J" against downward movement. The bar can be raised above the "J" (which pivots clockwise to permit this). If the bar is then lowered, it strikes the rear of the top of the long arm of the "J", causing the "J" to pivot anti-clockwise. The bar thus avoids the hook, and can pass below

the "J" catch. Of course, numerous other detent arrangements serving this purpose are well known. An alternative is described below with reference to Fig. 8.

The support platform assembly of Fig. 1 is, in its contracted state, about 6 feet high, 4 feet wide, and 2 feet from front to rear (i.e. about 1.8 x 1.2 x 0.6 metres). With the tower fully raised, the platform is at a height of 12 feet (3.6 metres). Of course, larger or smaller assemblies are possible.

Any suitable materials may be used. Usually the structural girders etc. will be of aluminium. The bottom stage may be of heavier grade materials, since it bears most weight.

The embodiment shown in Figs. 7 to 15 has only two stages 100,102. They are constructed mainly of round-section aluminium tube. Each stage is rectangular in plan, the upper stage 102 being slightly smaller than the lower stage 100, into which it fits slidably and removably. Each stage has four main uprights 104, bridged by horizontal struts. Each side face of the upper stage has a top strut 106 and four support struts 108. One side face has additional struts to create a ladder 110. Each side face of the lower stage 100 has a top strut 112 and (at successively lower positions) a detent support strut 114 and two wheel location struts 116. At one side there are further struts 118 to provide a ladder structure. The rear face of the lower stage 100 may have a diagonal bracing strut, whereas

the front face is preferably open to facilitate access to the interior. It is intended that the user should be generally inside the structure when ascending and descending. Thus his weight does not tend to cause toppling. The user can stand inside the structure and lift or lower the upper stage.

At each side, the lower stage 100 has a detent support strut 114 supporting a detent mechanism 120. This is designed so that a support bar 108 of the upper stage can move past it freely either upwardly or downwardly to permit raising or lowering. However, if a support bar 108 is moved upwardly to an engagement level and then moved back downwardly, it is trapped by the detent mechanism 120, against further descent. The mechanism can take various forms. The type shown in Fig. 7 involves a suspended bar 122 mounted beneath the support strut 114 by a pair of linkages 124. The nature of each linkage can be understood from Fig. 8. A linkage involves a lower cradle 126 and an upper pivoted arm 128. The cradles 126 at one side are linked by the bar 122. Figs. 8a to 8e show a support strut 108 of the upper frame being raised and engaged by the detent mechanism 120. As shown in Fig. 8b, the rising strut 108 first abuts the underside of the cradle 126, pivoting it and the arm 128 anticlockwise. Beyond a certain point, the cradle drops back (Figs. 8c,d). If the support strut 108 of the upper stage is then lowered, it is trapped by the cradle 126 (which cannot rotate clockwise beyond a certain point

because of abutment with the main uprights 104). Figs. 8f to 8j show the unlocking. The upper stage is raised further. Fig. 8f corresponds to Fig. 8d, the strut 108 raising the arm 128. Continued lifting enables the strut 108 to go past the arm 128, which drops back. (It is spring-urged clockwise, to press against the cradle.) If the upper stage is then lowered, the strut 108 abuts the curved upper surface of the arm 128, and urges it to pivot clockwise. An edge region of the cradle then comes into contact with the curved inner surface of the arm, which is adapted so as to cause it to pivot anticlockwise. Thus as shown in Fig. 8i, the arm 128 can pivot farther clockwise, so that the strut 108 can move downwardly beyond the detent mechanism 120.

The upper stage 102 has four support bars: one adjacent its bottom, and three at successively higher levels (all spaced beneath the top strut 106). When the detent mechanism 120 engages the top support bar 108, the upper stage is fully retracted. When it engages the bottom support bar 108, the upper stage is fully extended.

As shown in Fig. 9, the lower stage may have support legs 130 engageable with the main uprights 104. A convenient form of support leg 130 consists of a tubular strut 132, having attachment means 134 adjacent one end. These comprise an upper angle stop 136 for abutting (and partially embracing) an upright 104, and a securing clamp 138 spaced slightly beneath it. A suitable form of securing clamp 138 is shown in Fig. 10. Thus the strut 132 has a

projection bearing a ball or multi-flat sphere 134. A pair of clamp jaws 135 are coupled via a screw linkage 139 with a coaxial spring 140 urging the jaws apart. At one end the jaws are adapted to embrace an upright 104. At the other end, they embrace the sphere 134. Each upright may have at a lower region a spring clip 140. Thus for transit or storage, the legs are slid to the position shown in the left of Fig. 9, and clamped to the supports by means of the clips 140. For providing support, the screw linkage 139 of each leg is loosened, so that the leg can be lowered somewhat and pivoted outwardly so that the angle stop 136 abuts the upright, and the bottom end of the leg is on the ground, as shown at the right in Fig. 9. (The leg can be slid to a suitable position to allow for sloping or uneven ground.) The screw linkage 139 is then tightened.

The legs 130 can also be clamped in different configurations. For example, two assemblies can be connected by horizontally extending struts 132 if the ends that normally engage the ground are provided with further clamps. Higher towers can be constructed by engaging extension leg members beneath the bottom uprights. These may extend outwardly as well as downwardly, and have means for engaging the bottom ends of the support legs 130 so that these provide bracing.

Wheel members can be provided for transport. As shown in Fig. 11, they can be temporarily attached by means of a pair of lateral projections 140,142 on a main upright of the

lower stage. Thus a wheel member 144 may have an upright support 146 bearing at its lower end a bracket 148 with a wheel 150. The support carries an upper C-shaped clip 152 and a lower U-shaped clip 154. To engage the wheel member, the C-shaped clip 152 is offered up to the upper lateral projection 140. The wheel member is then pivoted about this, so that the upright is gradually raised slightly as the wheel 150 is rolled along the ground G towards it. Finally the lower projection 142 is received in the U-shaped clip 154. The wheel member 144 can also be used to extend the length of a main upright 104, e.g. for working on stairs. Thus use may be made of a double spigot member having one end received in the bottom of an upright, and the other end received in an end of the support 146 of the wheel member (which may be inverted).

For normal use, the uprights may have foot members. A preferred form is shown in Fig. 12. It consists of a ground engaging square plate 156, with a tubular spigot 158 adjacent one corner. This is received within the end of an upright 104. Thus the plate 156 can be swung round from a transport and storage configuration in which it is generally within the base of the support platform, to a support configuration in which it projects outwardly. It may have a sprung pin 160 which then projects through an aperture in the upright to lock it in this configuration. Fig. 13 shows a variant in which the spigot 158' has a coarse external thread and passes through an adjusting nut 161 by means of

which the effective height can be varied.

The upper stage 102 is provided with a platform assembly. Preferably this is removable and can be installed at different heights, engaging on either the top struts 106 or any of the lower support struts 108. (Preferably the upper stage 102 is so dimensioned that it can be used independently of the lower stage. For some purposes it may be laid on its side. The various struts may then define one or more openings in which the platform assembly is engageable, so that the whole can be used as a trestle.) As shown in Figs. 14 and 15, the platform suitably has a generally rectangular frame 162, with cut-outs for engaging the various upright members. The frame bears a fixed floor portion 164 that covers slightly under half of it, and a movable floor portion 166. As can be seen in Fig. 15, the frame 162 has spring clips 168 by which it engages horizontal members of the upper stage 102. Adjacent the edge of the fixed floor portion 164, it has slots with angled surfaces defining a movable floor guide 170. This provides a narrow, angled channel such that the movable floor portion 166 can be tipped up and slid downwardly through it until it abuts uprights 104. The channel is so narrow that there is no chance that someone standing on the edge of the movable floor section 166 would cause it to tip and fall through. On its underside, the movable section 166 has hook members 172 that engage around a support strut 174 that bridges the frame 162 adjacent the channel 170.

For use when the platform is mounted at one of its higher positions, there may be a safety rail structure, having struts that extend telescopically within the upper regions of the corner uprights of the upper stage. The upper ends of the struts may be connected by horizontal frame members. At the lower regions the struts may have apertures, and there may be spring-loaded pins on the uprights which engage in the apertures to prevent the safety rail from being accidentally withdrawn completely. There may also be a check cable extending within the struts and the uprights of the upper stage to prevent withdrawal.

CLAIMS:

1. A support platform assembly for supporting a person, the assembly comprising at least two telescoping stages; the assembly being lockable in a plurality of configurations differing in the degree of telescoping and hence in height; the assembly further including a platform mounted or mountable to an upper stage; the platform having a portion which is movable from a support position to create an opening; the stages and platform being arranged such that a user can ascend the stages generally inside the assembly, climb through said opening, and return the movable portion of the platform to its support position.

2. An assembly according to claim 1 wherein said upper stage is arranged so that the platform is mountable to it at a plurality of different levels.

3. An assembly according to claim 1 or 2 wherein said upper stage is removable from the lower stage(s) and may be laid horizontally so that the upper side provides a site for locating the platform.

4. A support platform assembly for supporting a person, the assembly comprising at least two telescoping stages; the assembly being lockable in a plurality of configurations differing in the degree of telescoping and hence in height.

5. An assembly according to any preceding claim wherein there are, associated with the bottom stage, support legs movable between a storage configuration and a support

configuration in which they extend outwardly from an upper region of the bottom stage to engage the ground.

6. An assembly according to claim 5 in which the support legs are lockable to the bottom stage at different heights.

7. An assembly according to any preceding claim wherein the telescoping stages have detent means such that a stage is automatically retained against descent if raised to a locking configuration, but can be raised above this configuration and then lowered beneath it.

8. An assembly according to claim 6 wherein each detent means comprises a pivoted cradle member rotatable upwardly from a retaining configuration, to which it is urged, to a non-retaining configuration; and a pivoted arm generally above the cradle member and having an arcuate cam surface such that when it is urged against the cradle member the latter is displaced towards its non-retaining configuration; the arrangement being such that when a lower stage is raised, an element thereof first abuts the cradle member from beneath, pivots it to its non-retaining configuration, and moves past; whereupon the cradle member moves back to its retaining configuration so that the element is retained thereby if it is lowered; but if the element is raised farther it passes the arm and, if subsequently lowered, abuts the upper surface of the arm thus urging the arcuate cam surface against the cradle member and enabling the element to descend past the cradle member.

9. An assembly according to any preceding claim having wheel members pivotably attached or attachable to the bottom stage so as to be pivotable to raise a normally ground-engaging portion off the ground and provide support via a wheel.

10. A support platform assembly substantially as herein described with reference to and as illustrated in the accompanying drawings.

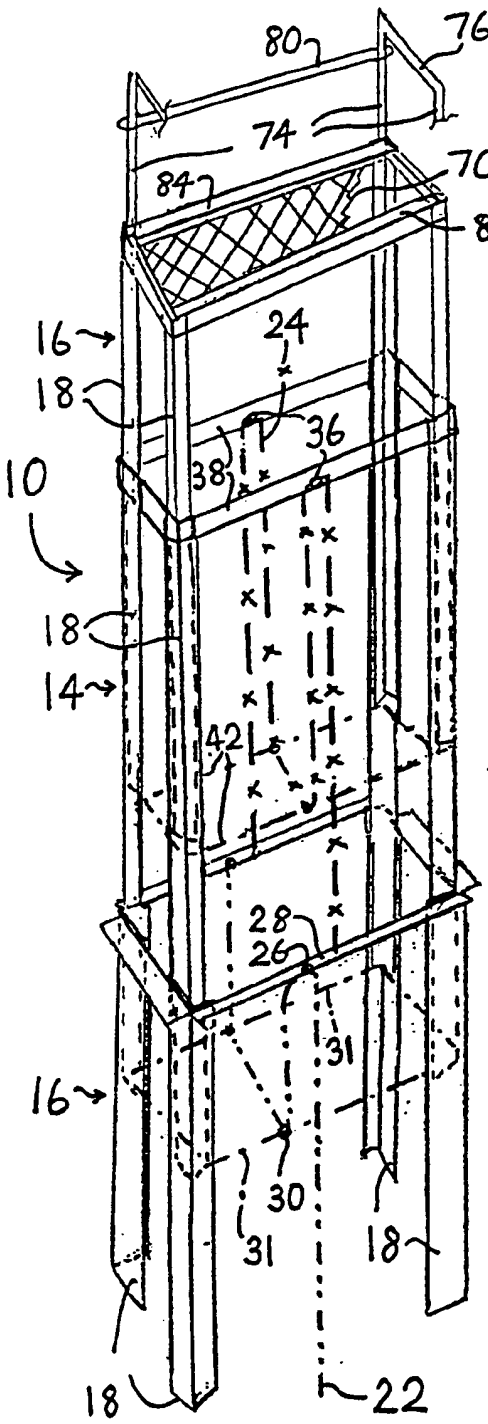
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Fig 1

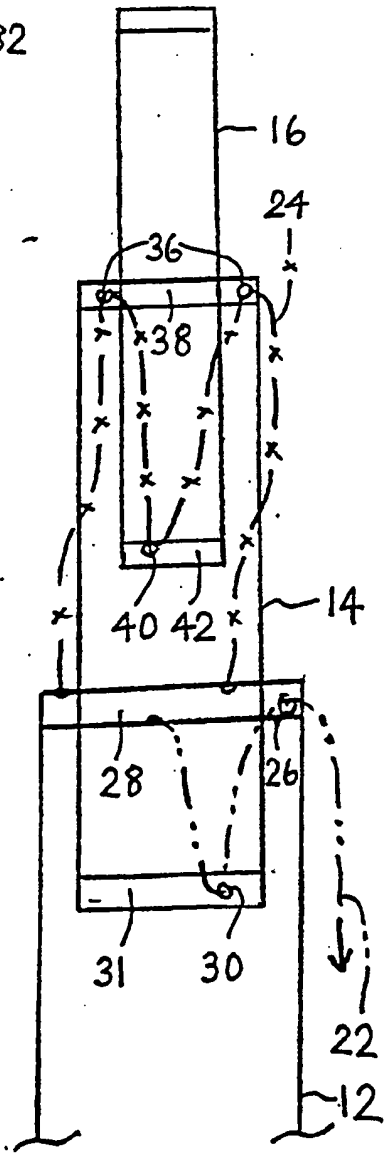
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Fig 2

Fig 3

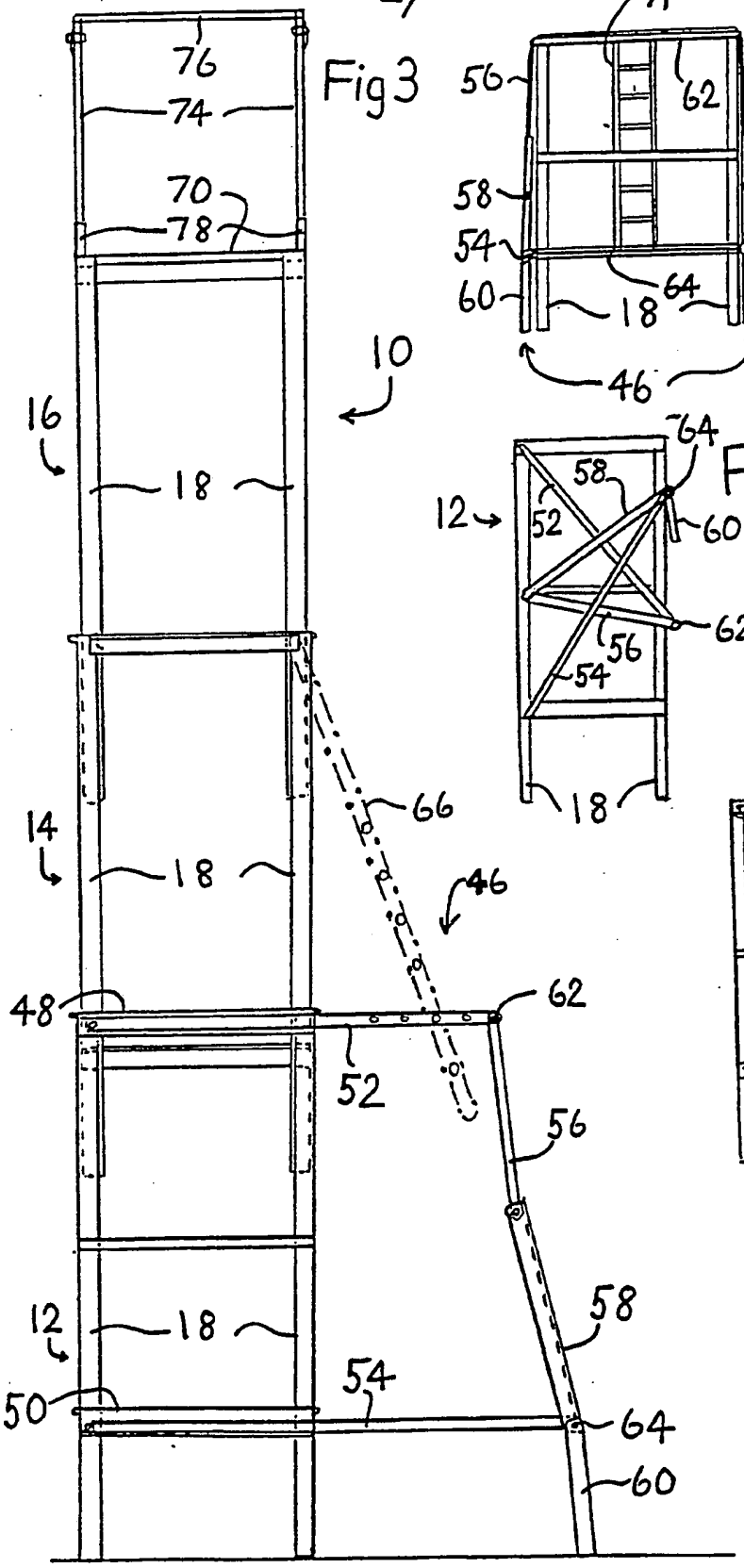





Fig 4




Fig 5

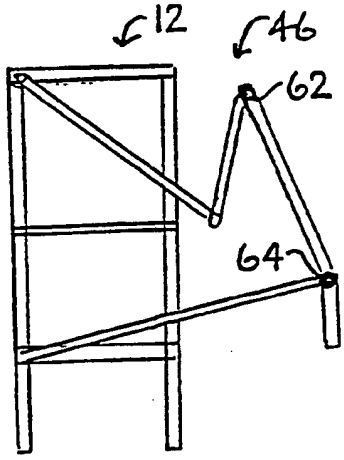


Fig 6

Fig 7

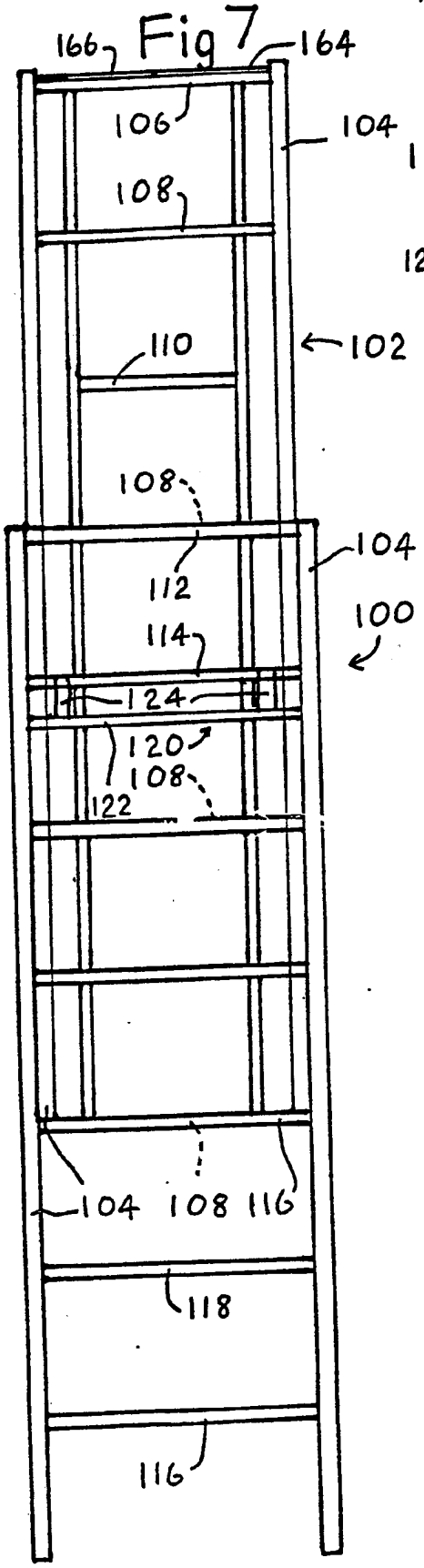
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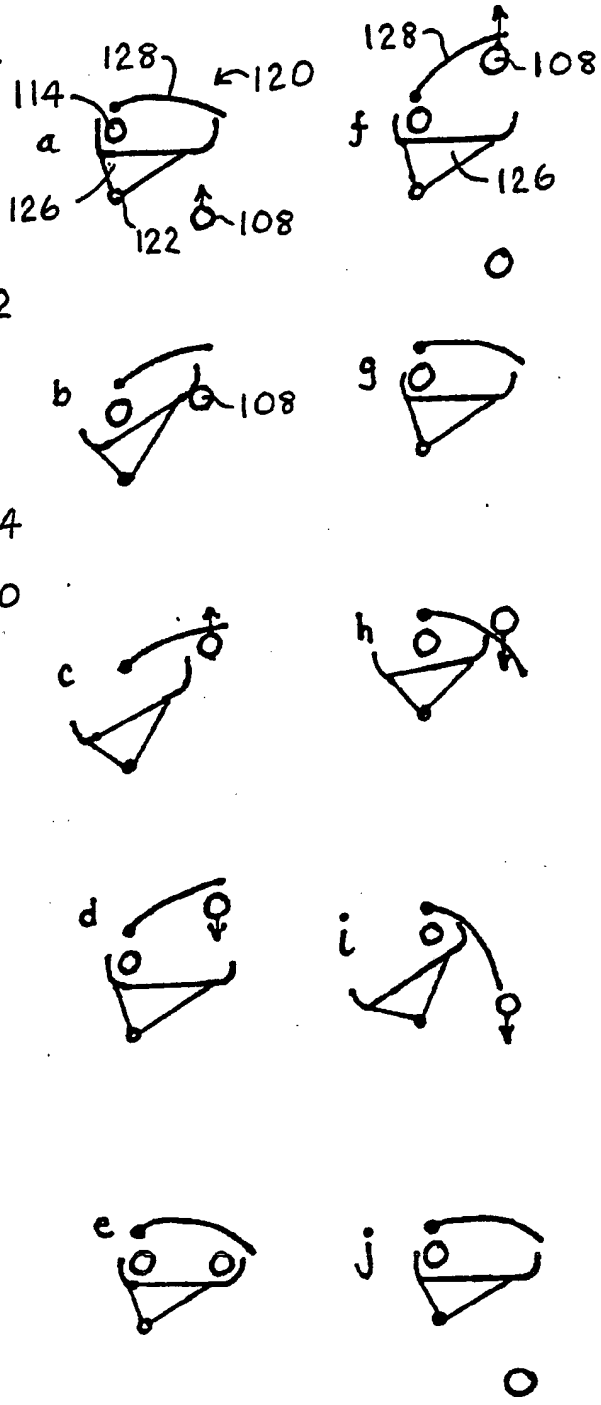
Fig 8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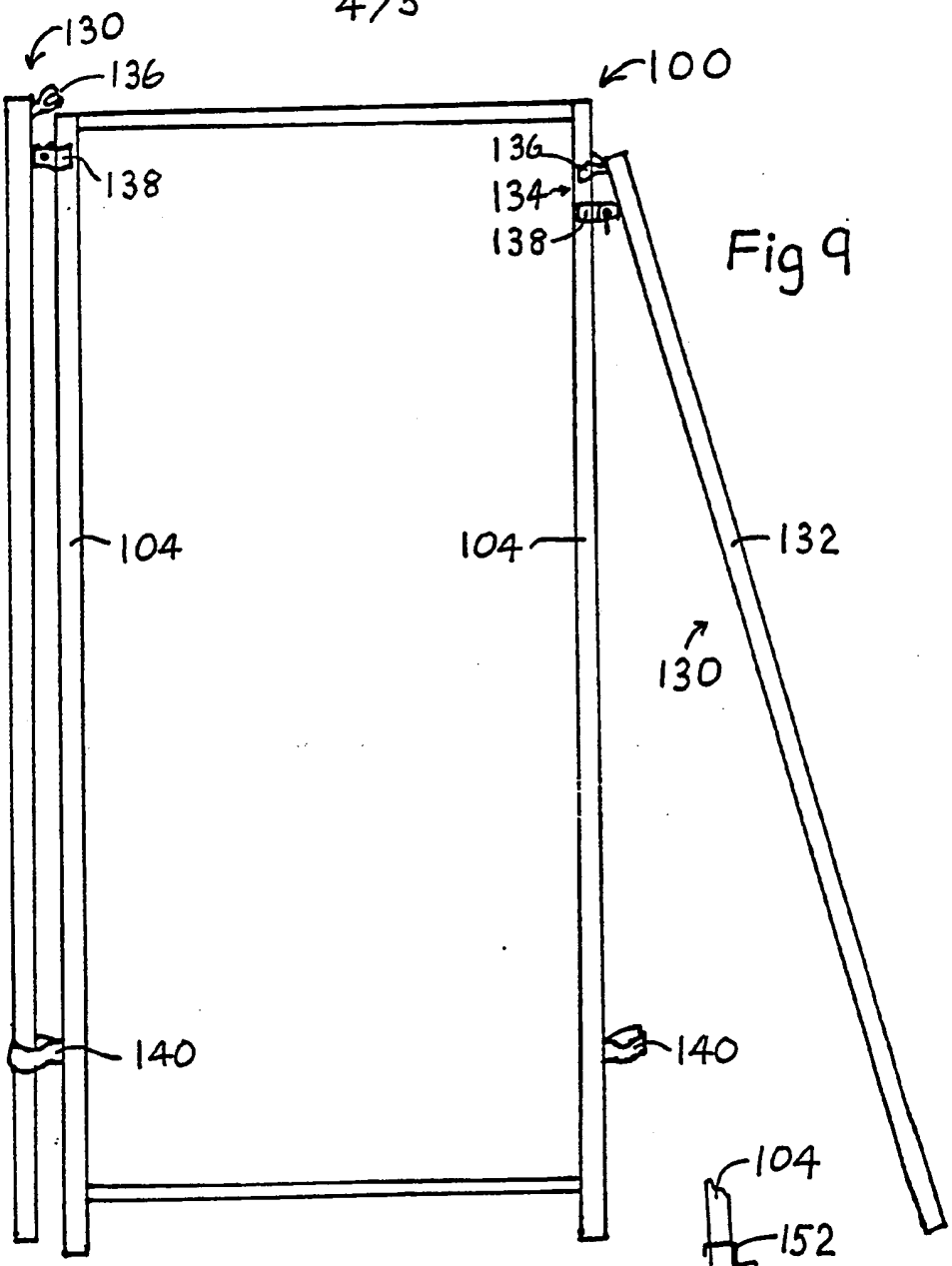


Fig 9

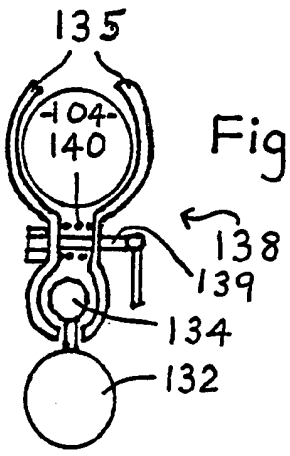


Fig 10

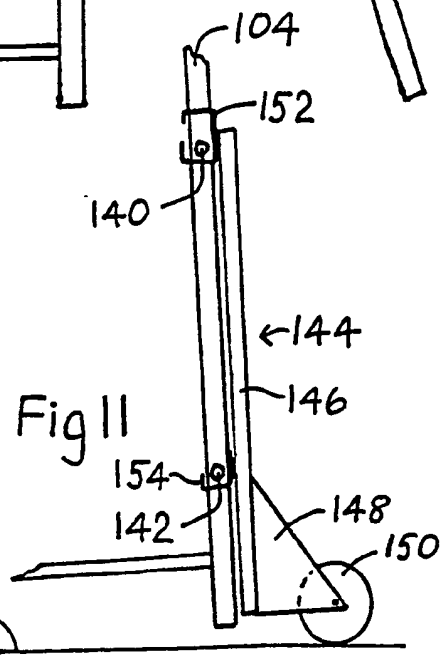


Fig 11

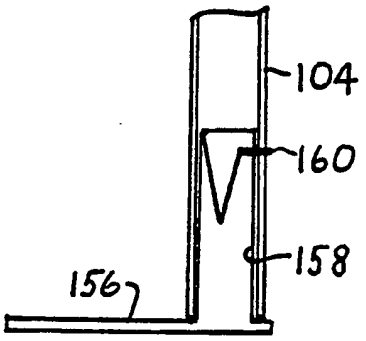


Fig 12

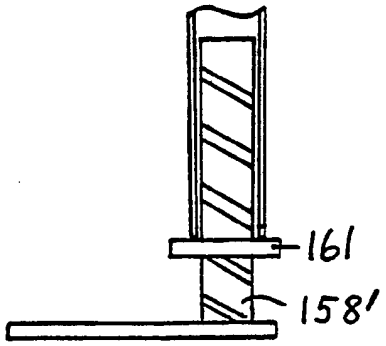


Fig 13

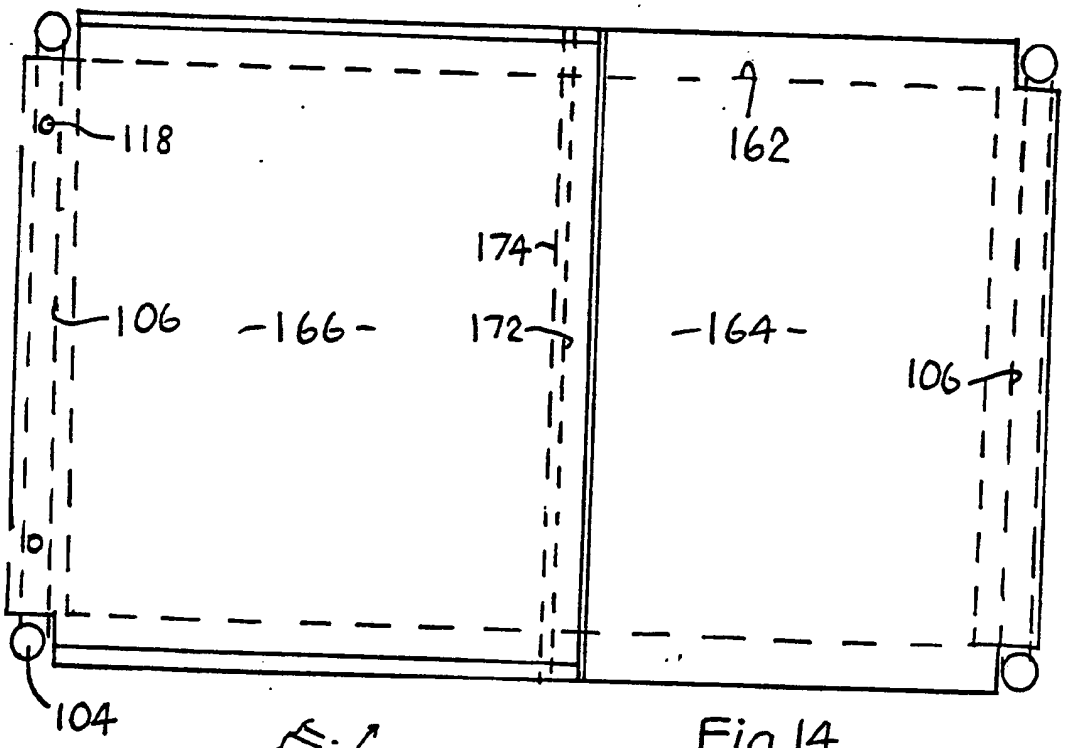


Fig 14

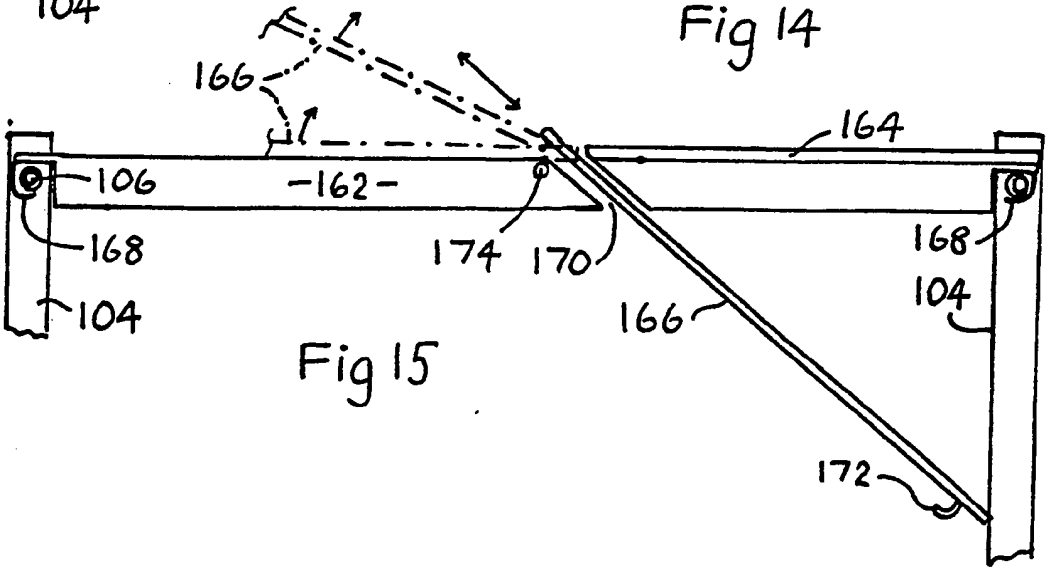


Fig 15